

THREATENED SPECIES SCIENTIFIC COMMITTEE

Established under the *Environment Protection and Biodiversity Conservation Act 1999*

The Minister's delegate approved this Conservation Advice on 15/07/2016.

Conservation Advice

Eremophila verticillata

whorled eremophila

Conservation Status

Eremophila verticillata (whorled eremophila) is listed as Endangered under the *Environment Protection and Biodiversity Conservation Act 1999* (Cwlth) (EPBC Act). The species is eligible for listing as prior to the commencement of the EPBC Act, it was listed as Endangered under Schedule 1 of the *Endangered Species Protection Act 1992* (Cwlth).

The whorled eremophila is listed as Critically Endangered in WA under the *Wildlife Conservation Act 1950*.

The main factors that are the cause of the species being eligible for listing in the Endangered category are small area of occupancy, low number of plants, decline in the number of plants and populations and a decline in area and quality of habitat.

Description

The whorled eremophila is a small shrub to 1 m high and 80 cm across. Its erect or spreading branches are nearly cylindrical in cross-section. The lower section of the branches may be bare of leaves on mature plants. The leaves are fleshy, stalkless, green to purplish, in whorls of 3 and are pressed against the branches. They are a narrow oblong in shape, 2.5 - 6 cm long by 1 mm wide. The flowers are tubular, violet and have a white interior with purple spots. The outside of the corolla is covered with soft hairs. The fruits are dry, egg-shaped, 2 - 3 mm long by 1 to 2.5 mm wide, beaked, slightly separated at the apex and covered with feather-like hairs (Brown et al., 1998 in Pillimore & Brown 2003).

The whorled eremophila is closely related to *E. ternifolia* but differs in its smaller, narrower, appressed leaves and different shaped fruit, in which the carpels are neither unequal or free in the upper half (Chinnock 1986 in Pillimore & Brown 2003).

Distribution

The whorled eremophila is endemic to Western Australia where it is confined to the Lake Cobham area. Habitat is powdery brown loam over dolomite in open low Eucalypt woodland of *E. longicornis* (red morrel), *E. annulata* (open fruited mallee) and *E. flocktoniae* (Merrit) over *Maireana erioclada* (rosy bluebush) and *Threlkeldia diffusa* (coast bonefruit) (Chinnock 1986 in CALM 2003). Other associated species include *Melaleuca thyoides* (salt lake honey-myrtle), *Dodonaea concinna* and *Enchylaena tomentosa* (ruby saltbush) (Pillimore & Brown 2003).

In 2003, the whorled eremophila was known from two populations located near Lake Cobham and it was presumed that three previously recorded populations, located near, Lake Cobham, Karlgarin and Newdegate respectively, were extinct (Pillimore & Brown 2003).

Relevant Biology/Ecology

The *Eremophila* genus is endemic to Australia and is represented in all mainland States. There are some two hundred named species and many unnamed ones. While most occur in semi-arid and arid regions, they are found in a range of habitats over a wide area. *Eremophila* species are not found in the high rainfall south-west corner of Western Australia. The plants are commonly referred to as emu bushes or poverty bushes (Pillimore & Brown 2003).

The pollinator of whorled eremophila is unknown, although cabbage butterflies (*Pieris rapae*) have been observed feeding on the flowers (Pillimore & Brown 2003).

A prescribed burn was undertaken at the population west of Lake Cobham by Departmental Science Division and Katanning District staff in 1994, as part of a study on six *Eremophila* species (Pillimore & Brown 2003). Ten mature, senescing plants were burnt. Monitoring of the burn site in June 1995 by staff from the Katanning District recorded 13 seedlings with an average height of 5 cm, most occurred close to parent plants. One seedling was located 13 m away from the nearest possible parent, but was still within the burn area. In 2003, seven plants remained at this site (Pillimore & Brown 2003). No epicormic growth was observed, suggesting that the species is killed by fire and regenerates only from soil-stored seed. A visual assessment of the relative density of the starch grains within the roots did, however, result in a visual starch rating of six, suggesting the species may also possess some characteristics of a resprouter (Richmond and Coates 1995).

Threats

Table 1 – Threats impacting the whorled eremophila in approximate order of severity of risk, based on available evidence.

Threat factor	Threat type and status	Evidence base
Invasive species		
Invasive Weeds	known current	Disturbance created by activities such as mining or clearing provide suitable conditions for weed proliferation, this effects early plant growth through completion for nutrients, soil moisture and light (Pillimore & Brown 2003).
Fire		
Too frequent burning	suspected current	High frequency of fires, effecting plant before reaching maturity, may reduce the soil seedbank for this species leading to a continued decline (Pillimore & Brown 2003).
Long intervals between fires	known	Conversely, long intervals between fires maybe also detrimental to the whorled eremophila (Pillimore & Brown 2003). Long absences in fire reduces the opportunity of seed recruitment (Pillimore & Brown 2003).
Habitat loss and fragmentation		
Road Maintenance	future	One of the two populations has the potential to be effected by road maintenance (Pillimore & Brown 2003). This includes activities such as grading, construction of drainage channels and spraying weeds.
Lack of disturbance	known	Whorled eremophila benefits from disturbance and in 2004 it was noted that at the two populations many mature plants had begun to senesce (Pillimore & Brown 2003).
Competition with parasitic species		
Competition with native parasitic <i>Cassytha</i> spp. (dodders).	potential	Competition from a dodder species (<i>Cassytha</i> spp.) is a minor threat to the population north-west of Lake Cobham (Pillimore & Brown 2003). Dodder cover some adult plants, competes for light, nutrients and possibly pollinators and physically restricts the whorled eremophila.

Conservation Actions

Conservation and Management priorities

Invasive species

- Identify and undertake weed control in the local area that could become a threat to the whorled eremophila, using appropriate methods. Consider the possible disturbance/overspray threats associated with the control method.

Fire

- Fires must be managed to ensure that prevailing fire regimes do not disrupt the life cycle of the whorled eremophila, that they support rather than degrade the habitat necessary to the whorled eremophila, that they do not promote invasion of exotic species, and that they do not increase impacts of grazing/predation.
- Physical damage to the habitat and individuals of the whorled eremophila must be avoided during and after fire operations.
- Provide maps of known occurrences to local and state Rural Fire Services and seek inclusion of mitigation measures in bush fire risk management plan/s, risk register and/or operation maps.
- The use of aerosol smoke provides a more effective alternative for stimulation of the seed bank – and in conjunction with ex situ propagation from regenerating individuals to provide an off-site insurance population.

Seed collection, propagation and other ex situ recovery action

- Investigate propagation approaches and develop trial translocation approaches based on the success of other programs undertaken by the Kings Park and Botanic Gardens and if appropriate implement plan for translocation and propagation.
- Maintain ex situ storage of seed to support efforts to propagate and reintroduce the specie

Habitat loss disturbance and modifications

- Prevent access habitat disturbance. Control access routes by installing gates to suitably constrain vehicle access to known sites on public land and manage access on private land and other land tenure to prevent accidental damage of whorled eremophila individuals.
- Employ the use of DRF¹ markers to identify the location of individuals to prevent damage occurring.
- Ensure land managers are aware of the species' occurrence and provide protection measures against key and potential threats.

¹ DRF markers are used in Western Australia and are two standardised yellow markers at either end of a site, which are bent to face towards each other, indicating that DRF plants may occur anywhere between the markers, from the road's running surface to the fence. They alert people working in the vicinity to the presence of DRF, and the need to avoid work that may damage vegetation in the area (DEC 2013).

Stakeholder Engagement

- Negotiate with the Shire of Lake Grace and the Department of Transport in relation to the future care, control and management of Lake Cobham which contains both extant populations of the whorled eremophila.
- Identify who the relevant stakeholders are e.g. traditional owners, local people, private landowners, public land managers, pastoralists, industry (e.g. mining).
- Fire management authorities and land management agencies should be provided with suitable maps and field markers to avoid damage to the whorled eremophila.
- Land managers (including pastoralists, indigenous communities, etc) should be given information about managing fire for the benefit of the whorled eremophila.

Survey and Monitoring priorities

- More precisely assess population size, ecological requirements and the relative impacts of threatening processes by designing and implement a monitoring program.
- Monitor the progress of recovery, including the effectiveness of management actions and the need to adapt them if necessary.
- Monitor the size and structure and reproductive status of populations at different stages in the fire cycle, taking opportunities to monitor after planned and unplanned fires (where they occur) and improve understanding of the fire response of the whorled eremophila.

Information and research priorities

- Investigate options for linking, enhancing or establishing additional populations.
- Undertake survey work in suitable habitat and potential habitat to locate any additional populations and occurrences to more precisely assess population size and distribution.
- Assess the ecological requirements relevant to the persistence of the species.
- Undertake seed germination and/or vegetative propagation trials to determine the requirements for successful propagation and trial translocation approaches based on experiences of Kings Park and Botanic Garden.
- Implement an annual census to monitor emergence and resprouting success for the whorled eremophila.
- Determine soil seed bank dynamics and spatial extent and the role of various disturbances, competition, flooding and rainfall on the germination and recruitment of this species.
- Improve understanding of the mechanisms of response to application of smoke as an alternative to implementing fire regimes and identify appropriate frequency of application regimes for conservation of the threatened whorled eremophila by undertaking appropriately designed experiments in the field and/or laboratory.
- Where appropriate, use understanding and research on smoke and fire responses among related (e.g. congeneric) or functionally similar to the whorled eremophila to develop fire management strategies for conservation.

References cited in the advice

Pillimore, R. & Brown, A. (2003). Whorled eremophila (*Eremophila verticillata*) interim recovery plan 2003-2008. Western Australia Department of Conservation and Land Management, Wanneroo, Western Australia.